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THESIS

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MEASURING THE PERCEIVED EFFECTIVENESS OF THE INTERNAL REVENUE SERVICE'S (IRS) DIRECT FILING SYSTEM FROM THE END-USER PERSPECTIVE

by

Margaret Yvonne Hall

MARCH 1991

Thesis Advisor: Tung Bui

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Although the objectives and potential benefits are clear for the Internal Revenue Service and some software developers on promoting Electronic Filing Systems (EFS), it is not that obvious for tax preparers and the public at large. As a consequence, the current rate of EFS usage is still below expectation. Based on a study on the Measurement of End-User Computing Satisfaction, an empirical survey was conducted among the tax preparers community in Central California to determine factors that could help increase EFS use. Our findings seem to confirm the results cited in the End-User Compuiting literature. Software reliability, flexibility, efficiency and ease of use, quality of documentation, ability to make corrections, and timeliness were the most relevant findings. These factors received high scores from the interviewees. Nevertheless, training appears to be a crucial factor to convince tax preparers of the reliability of EFS, and tax preparers should be encouraged to devote more time in getting acquainted with the documentation provided by the IRS which was generally perceived as satisfactory. Another concern in EFS use was cost, although this factor was not included in the statistical analysis.

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Measuring the Perceived Effectiveness
of the Internal Revenue Service's (IRS) Direct Filing System
from the End-User Perspective

by

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Lieutenant, United States Navy
B.A., Benedict College, 1979

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
IN INFORMATION SYSTEMS

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NAVAL POSTGRADUATE SCHOOL

MARCH 1991

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Department of Administrative Sciences

ABSTRACT

Although the objectives and potential benefits are clear for the Internal Revenue Service and some software developers on promoting Electronic Filing Systems (EFS), it is not that obvious for tax preparers and the public at large. As a consequence, the current rate of EFS usage is still below expectation. Based on a study on the Measurement of End-User Computing Satisfaction, an empirical survey was conducted among the tax preparers community in Central California to determine factors that could help increase EFS use. Our findings seem to confirm the results cited in the End-User Computing literature. Software reliability, flexibility, efficiency and ease of use, quality of documentation, ability to make corrections, and timeliness were the most relevant findings. These factors received high scores from the interviewees. Nevertheless, training appears to be a crucial factor to convince tax preparers of the reliability of EFS, and tax preparers should be encouraged to devote more time in getting acquainted with the documentation provided by the IRS which was generally perceived as satisfactory. Another concern in EFS use was cost, although this factor was not included in the statistical analysis.

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I. INTRODUCTION

Although the objectives and potential benefits are clear for the Internal Revenue Service and some software developers to promote Electronic Filing Systems, it is not that obvious for tax preparers and the public at large. The literature advocates that to guarantee a successful implementation of Information Systems, the Information System's goals should perfectly reflect the goals of the organization [Ref. 1]. The Electronic Filing System involves at least four user communities: IRS, Tax preparers, the Public and software designers. Under the presence of multiple entities coupled with the proliferation rate of end-user computers, it is crucial to understand how a consensus can be reached. To address this issue, each of the following research issues had to be explored for each of the constituencies. "Is the system effective and if so, to what degree are the end-users satisfied?" "What is meant by effectiveness?" and "What factors are used to measure effectiveness?"

A. OBJECTIVE STUDY

The literature suggests a number of criteria for success of Management Information Systems-profitability [Ref. 2], end-user satisfaction [Refs. 1, 3, 4, 5], system usage [Refs. 6, 7, 8, 9, 10], performance [Ref. 6] and job satisfaction [Ref.

6]. Of these perspectives, end-user satisfaction and system usage are the most widely used measures [Refs. 2, 11] and thus have been adopted by this study as the indicators of the perceived effectiveness or success of Management Information Systems.

End-user computing satisfaction (EUCS) can be measured in a decision-making organization [Ref. 1]. An end-user application's utility in decision making is enhanced when the outputs meet the user's expected information needs and the application is easy to use [Ref. 1]. "Ease of use" or "user friendliness" is especially important in organizations facilitating voluntary use of inquiry of decision support systems, or Management Information Systems [Ref. 1]. In voluntary situations, system usage can also be a measure of system success. Barpido, et al., (1986) suggest that, "satisfaction leads to usage rather than usage stimulating satisfaction." Thus, user satisfaction may be the critical factor in measuring the success of Information Systems. Most studies conducted in the realm of Information Systems has focused on general satisfaction rather than on a specific software application, and they have omitted aspects important to end-user computing such as ease of use [Ref. 1]. A study on the Measurement of End-User Computing Satisfaction by Doll and Torkzadeh distinguished between user information satisfaction and an end-user's satisfaction with a specific application [Ref. 1]. Their study attempted to measure the satisfaction of

users who directly interact with a specific application [Ref. 1]. The results of their study identified five factors which they considered should be used as a standard instrument for measuring end-user computing satisfaction. The factors were content, accuracy, format, ease of use, and timeliness. [Ref. 1]

This study will replicate the Doll and Torkzadeh study [Ref. 1] to determine whether or not the same findings would apply in the Internal Revenue Service's case. The focus was on measuring EUCS among tax preparers. The goal of this study was to develop an instrument that:

1. Focuses on satisfaction with the information product provided by a specific application.
2. Includes items to evaluate the ease of use of a specific application.
3. Determines the factors end-users perceive important in measuring EUCS.

B. PROBLEM STATEMENT

In any end-user computing environment, decision makers interact directly with the application software to enter information or prepare output reports. The environment will typically include a database, a model base, and an interactive software system that enables the user to directly interact with the computer system. In an end-user computing environment, analysts, programmers and operations staff are

less directly involved in user support; and as a result, users assume more responsibility for their own applications. System personnel might assist in the selection of appropriate software tools, but the end-users are largely on their own to implement, modify, and run their own applications. "Training programs, experienced colleagues, and manuals provide some assistance. However, the goal of Management Information System staff and service policies typically focuses on enabling end-users to function more independently, to solve many problems on their own." Ease of use has become increasingly important in software design (Branscomp and Thomas, 1984). There is increasing evidence that the effective functioning of an application depends on its ease of use or usability (Goodwin, 1987). "If end-users find an application easy to use, they may become more advanced users, and therefore, better able to take advantage of the range of capabilities the software has to offer. Also, ease of use may improve organizational productivity [Ref. 1]." This study is based on our belief that there are certain underlying factors which should be considered when promoting effective Information Systems. The Internal Revenue Service's Electronic Filing System was used to study these factors.

C. METHODOLOGY

The sample size was limited to Central California. Factor Analysis and Linear Regression was used to analyze the data collected from the questionnaire.

D. SCOPE AND LIMITATIONS

Electronic Filing System encompasses different categories of users: IRS, taxpayers, software users and the public at large. This thesis focuses only on the tax preparer community. Our assumption was based on the fact that most tax-payers who wish to use EFS would go through a professional tax preparer. Since EFS implementation is still in its early phase, the results of our study may not be extrapolated.

II. BACKGROUND

A. BRIEF EXPLANATION OF EFS

The electronic filing of federal individual income tax returns began as a pilot in 1986, when five participants in three metropolitan areas filed more than 25,000 electronic tax returns. It became an operational system in 1987 with 78,000 returns filed by 60 practitioners in seven metropolitan areas. Today electronic filing is available in all 50 states. Electronic filing allows tax returns to be filed with the Internal Revenue Service via telephone lines with the use of modems. The Electronic Filing Systems are composed of three subsystems: (1) Communications Subsystem, which is comprised of both DIAL-UP and LEASED (dedicated modems, to allow the tax preparer/transmitter to call into the IRS computer). The tax-preparer/transmitter sends a tax return via modem to a communications processor. The processor receives the tax data to merge it into the processing subsystem and determine if a tax return has been received, and the creation of an acknowledgement tape file. (2) Processing subsystem consists of a UNISYS 1180 Mainframe computer and a series of COBOL programs to formulate and validate the information received by the Communications Subsystem. The processing steps are:

- Expansion creates fixed records.
- Return validation -- determines if there is a complete tax return.
- Assigns DLN.
- Block Control -- assigns a document control number.
- Code and Edit.
- Return record -- creation of what the electronic record becomes.
- DIS tape -- this tape is meshed with the key-entered paper return tax data to create one tape for the National Computer Center to release refunds.
- Acknowledgement record -- creates and acknowledges the acceptance of every electronically filed return back to the user.

(3) Archival/retrieval subsystem is a long-term and short-term storage vehicle for all electronically filed returns. Preparers/transmitters apply for admission into the program and send test transmission to determine the quality of their operation. Once accepted into the program they may transmit return data directly to the IRS via modem. This return data is processed and if valid, an acknowledgement file is sent to the transmitter. Error free returns are archived to optical disk for long-term storage. Returns that need corrections or adjustments are temporarily stored on disk to allow the tax examiner to perfect errors. Tax examiners use computers to "call-up" the tax return and make all corrections by creating a shadow page of the return.

This system eliminates many time-consuming manual processes, decreases the chances of error, and speeds the delivery of tax refunds to the American public. The goal -- less paper, less time-consuming and error prone manual processing. The electronic filing system offers many advantages to the electronic filer who:

- is saved from paperwork
- realizes lower mailing cost
- improves the quality of services provided and,
- receives a competitive edge.

The Internal Revenue Service benefits by:

- the elimination of error prone and time consuming processes
- improved quality
- enhanced service to the public and
- an expanded capacity for operation

The taxpayer also benefits from:

- a return processed with less chance of error
- acknowledgement that the tax return was received and,
- a refund up to three weeks sooner than those from paper returns.

B. PROBLEMS OF EFS

Despite the aggressive policy by the IRS to promote implementation and use of EFS throughout the nation, effective use of the system can be perceived as relatively low. According to the Commissioner's briefing on EFS, many private, not-for-profit organizations, and other government agencies have asked why the IRS has not developed software for their use. The two primary reasons the EFS office has not done this are (1) to avoid competition between the government and private industry in software development, and (2) the government cannot be held accountable for erroneous submissions. By not becoming involved in actual return preparation software, the IRS can maintain its proper autonomy in meeting its mission of Tax Administration. Although productivity and service to the taxpayers has far exceeded expectations, several additional problems were addressed in the report [Ref. 12]. It is important to note according to the commissioner's report that none of these problems are a result of system problems with Electronic Filing. Some of the problems do involve electronically filed returns. Here are some of the more notable problems and the circumstances related to them:

- Improper handling of tapes
- Timely receipt of refunds for electronic returns -- there have been several cases where taxpayers expressed concern that they had not received their refund in the two-to-three week period suggested by EFS. The major reason for

this circumstance is the filer's submission of the return to IRS. Filers are instructed to file returns timely and are monitored by the IRS personnel to ensure that they comply with this requirement. Most filers comply with this procedure, which results in timely acknowledgement by the IRS. The two-to-three week processing of the refund by EFS begins with the acknowledgement date. In cases where a filer delays submitting the return timely, it can increase the refund processing time by an additional week or more. This delay is a result of the processing cycle for all returns, paper and electronic, and is not a function of the Electronic Filing System itself.

- Difficulty in the posting of some Direct Deposit Payments with the Financial Management Service(FMS). The most prevalent circumstances are an error in the bank's routing transit number or an incorrect account number. Both of these numbers are provided by the taxpayers. When an erroneous number is provided the result is a non-posting of the refund, the problem is the inability of FMS to properly and timely post a credit to IRS for the returned Direct Deposit, so IRS can issue a paper check.

C. RESEARCH QUESTIONS

This study will explore the set of problems presented in the Commissioner's report and determine from the end-user's (tax preparers) perspective what they feel slowed the promotion of EFS, the factors they consider important in the successful implementation of EFS, and what can be done to improve system acceptability and usage.

III. A FRAMEWORK OF MEASURING END-USER COMPUTING SATISFACTION

A. INTRODUCTION TO END-USER COMPUTING SATISFACTION

The Management Information Systems Literature suggests various perspectives on measures of EUCS effectiveness: user satisfaction [Ref. 1, 5], which suggest a 12-item instrument that measures five components of end-user satisfaction -- content, accuracy, format, ease of use, and timeliness, and others which test several hypotheses such as the greater the perceived user friendliness of the software tool(s) used, the greater the overall user satisfaction. If the user's attitude toward computer applications is a positive one the higher will be the degree of overall user satisfaction, and the computer background of the user will also exert a moderating effect on the user's perception of the user friendliness of a software tool. System usage [Ref. 6, 9], which measures management use of the Information Systems and the impact of the Information System on organizational performance and the impact of a Management Information System on individual or organizational performance, also has a profound impact on measuring system success. Profitability [Ref. 1], in which three levels of measures were identified, operational, managerial, and strategic; and performance [Ref. 6] are also good measures.

But of these, user satisfaction has been adopted by his study as an indicator of EUC success.

B. MEASURING END-USER COMPUTING SATISFACTION

According to Benson (1983) and Lefkovitis (1979)

> "end-user computing has proliferated in the last ten years, and although in its early stages, signs of rapid growth are still evident. Rockart and Flannery (1983) found annual EUC growth rates of 50 percent to 90 percent. Benjamin (1982) has predicted that by 1990 EUC will absorb as much as 75 percent of the corporate computer budget. Because of these trends, Rockart and Flannery call for better management to improve the success of end-user computing. To improve management of EUC, Cheney (1986) call for more empirical research on the factors which influence the success of end-user computing. Henderson and Treacy (1986) describe a sequence of perspectives (implementation, marketing, operation, and economic) for managing end-user computing and identifying objectives for each phase. In the implementation phase, they maintain that objectives should focus on increased usage and user satisfaction."

As previously stated, Doll and Torkzadeh [Ref. 1] contrasts traditional versus end-user computing environments and reports on the development of an instrument which merges ease of use and information product items to measure the satisfaction of users who directly interact with the computer for a specific application. The researchers surveyed 618 end-users, and the results of their survey is contained in Figure 1.

The model suggest a 12-item instrument that measures five components of end-user satisfaction-content, accuracy, format, ease of use, and timeliness. The specific goals of their research were to develop an instrument that:

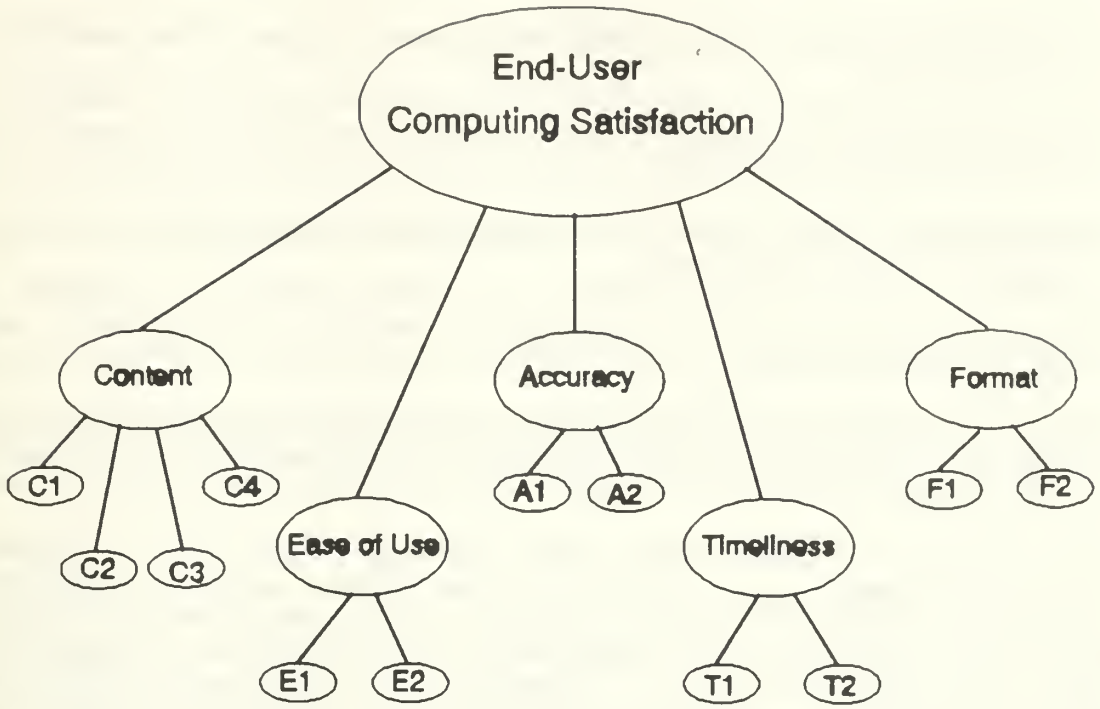

Figure 1. Summary of Model

CONTENT
C1: Does the system provide the precise information you need?
C2: Does the information content meet your needs?
C3: Does the system provide reports that seem to be just about what you need?
C4: Does the system provide Sufficient information?

EASE OF USE
E1: Is the system user friendly?
E2: Is the system easy use?

ACCURACY
A1: Is the system accurate?
A2: Are you satisfied with the accuracy of the system?

FORMAT
F1: Do you think the output is presented in a useful format?
F2: Is the information clear?

TIMELINESS
T1: Do you get the information you need in time?
T2: Does the system provide up-to-date information?

- Focuses on satisfaction with the information product provided by a specific application;
- Includes items to evaluate the ease of use of a specific application;
- Provides Likert-type scales as an alternative to semantic differential scaling;
- Is short, easy to use, and appropriate for both academic research and practice;
- Can be used with confidence across a variety of applications and
- Enables researchers to explore the relationships between end-user computing satisfaction and plausible independent variables.

An additional goal for the researchers was to identify underlying factors or components of end-user computing satisfaction. In developing the model for measuring end-user computing satisfaction, the researchers developed a 40-item instrument using a five point Likert-type scale, where 1 = almost never; 2 = some of the time; 3 = about half of the time; 4 = most of the time; and 5 = almost always. The instructions requested the users to write in the name of their specific application and, for each question, to circle the response which best described their satisfaction with this application. Next, a structured interview questionnaire was developed where users were asked open-ended questions such as: How satisfied were they with the application? What aspects of the application, if any, were they most satisfied with and why? What aspects of the application, if any, were they most

dissatisfied with and why? Correlation was done on each item against two corrected items, and items were eliminated if their correlation with the corrected item total was below .5 or if their correlation with the two-item criterion scale was below .4. The cutoffs the researchers chose were arbitrary for there is no accepted standards. The cutoffs were considered high enough to ensure that the items retained were adequate measures of the end-user computing satisfaction construct. These two criteria enabled the researchers to reduce the 38 items to 23. Five additional items were deleted because they represented the same aspects with only slightly different wordings. In each case, the wording with the lowest corrected item total correlation was deleted. In the pilot study, the remaining 18 items had a reliability (Cronbach's alpha) of .94 and a correlation of .81 with the two-item criterion scale. The researchers conducted an exploratory factor analysis and modified the instrument, examined discriminant validity of the modified instrument, and assessed reliability and criterion-related validity by nature and type of application. Factor analysis was used to identify the underlying factors or components of end-users satisfaction that comprise the domain of the end-user satisfaction construct. Items which were not factorially pure were eliminated to form a modified instrument. Using the sample of 618 responses, the data was examined using principal components analysis as the extraction technique and varimax as a method of rotation. Without

specifying the number of factors, three factors with eigne values greater than one emerged. These factors were interpreted as content/format, accuracy/timeliness, and ease of use/efficiency. In order for the researchers to achieve more precise and interpretable factors, the analysis was conducted specifying two, four, five and six factors. The researchers felt that specifying five factors resulted in the most interpretable structure. These factors were interpreted as content, accuracy, ormat, ease of use, and timeliness and explained 78.9 percent of the variance. The 12 item instrument had a reliability of .92 and a criterion-related validity of .76. The criterion was three separate measure of overall end-user satisfaction with the application. The reliability of each factor was: content = .89; accuracy = .91; format = .78; ease of use = .85; and timeliness = .82. The correlation of each factor with the criterion was: content = .69; accuracy = .55; format = .60; ease of use = .58,; and timeliness = .60. It is the opinion of the researchers that the instrument presented in this article represents substantial progress towards establishment of a standard instrument for measuring end-user satisfaction. The data according to Doll and Torkzadek support the construct and discriminant validity of the instrument. Furthermore, "the instrument appears to have adequate reliability and criterion-related validity across a variety of applications. This 12-item instrument may be utilized to evaluate end-user applications. In addition to an

overall assessment, it can be used to compare end-user satisfaction with specific components across applications.

IV. RESEARCH DESIGN

A. PROBLEM STATEMENT AND RESEARCH QUESTIONS

This study mentioned earlier that despite the aggressive policy by the IRS to promote implementation and use of EFS throughout the nation, effective use of the system can be perceived as relatively low. The problems cited earlier are also somewhat of a technical nature, in that they do not address critical issues pertaining to Management, Implementation and usage of Information Systems. In particular the commissioner's report overlooked the aspect of end-user resistance to using a new technology. This study will determine from the end-user (tax preparers) perspective the reasons they felt slowed the promotion of EFS, and the factors they consider important in the successful implementation of EFS and what can be done to improve system acceptability and usage.

B. SAMPLE CHARACTERISTICS

Data was gathered from the use of a questionnaire that was administered to 300 different firms -- all tax preparers located in the Central California area. The size of the firms ranged anywhere from a one person operation to a firm with 22 employees. A sample of 63 end-users actually responded to the questionnaire holding various positions in the firm -- CPA,

President, Tax preparer, Office Manager, Principal, Manager of Computer Department; with anywhere from one to two years experience with the Electronic Filing System. The two types of computers used by the firms were MacIntosh and IBM clones. Fifty-nine percent of the respondents used 2400 modems and 41% used 4800 modems. Fifty-seven percent of the respondents filled directly using software applications such as Lacrete, Drake, Am West, Orr Tax, Taxware, Taxview and Computer Craft. The remaining 43% filled electronically using a Tax service.

C. SURVEY METHOD

The data collected are based on the questionnaire borrowed from the work of Doll and Torkzadeh [Ref. 1]. The advantage of using this questionnaire is that it has been validated and successfully tested by the previous researchers. However, the questionnaire has been slightly modified to better represent the EFS and tax-preparers' environment. Section I of the questionnaire dealt more with demographics, and the hardware environment of the firm such as type of computer and modem used. Section II of the questionnaire was developed using 40 items which actually measured end-user computing satisfaction using a six-point Likert-type scale, where 0 = not applicable; 1 = almost never; 2 = some of the time; 3 = about half of the time; 4 = most of the time and 5 = almost always; The end-users were then asked to mark an X in the box which best describe their satisfaction with their application. Section

III was developed where users were asked open-ended questions such as: What aspects of the application, if any, were they most satisfied with? What aspects of the application, if any, were they most dissatisfied with? In their opinion what were the most important factors in promoting a successful use of EFS in their company? And, finally, the interviewees were asked for other comments.

D. STATISTICAL METHODS

The standard statistical methods that were applied to this research were mean values and standard deviations, linear correlation, factor analysis and linear regression using R-squared analysis. The SAS Program was used for factor analysis, and linear regression, and the statistical program, Minitab, was used to obtain results for Mean Values, Standard Deviations, and Linear Correlation.

1. Mean Values and Standard Deviation

Table I represents several descriptive measures of the data set pertaining to question 1 through question 40. The data indicate where the center or most typical value of a data set lies. The first entry of the output gives the number of pieces of data, which in this case for question 1 is 51. The next two entries displays the mean (MEAN) and median (MEDIAN) of the data set. In the fourth entry, labelled TRMEAN, we find the 5% trimmed mean. The fifth entry, STDEV, gives the sample standard deviation of the data. SEMEAN, shown next, stands for

"standard error of the mean." **MEAN** of the data set is defined to be the sum of the data divided by the number of pieces of data (average). For question 1 of the survey we found the mean to be 3.00 which indicates that 51 of the people surveyed felt that the system was flexible about half of the time. The **MEDIAN** of the data set is the number that divides the bottom 50% of the data from the top 50%. For question 1 of the survey we found the mean to be 3.00. For the purpose of this study the median would be more of an appropriate measure, because the median is not affected strongly by the relatively few surveys with extremely high or low responses, whereas the mean would be. Thus, the median provides a better indication in question 1 of how flexible end-users felt the system to be than the mean. The **TRMEAN** eliminates the bottom 5% and top 5% of the data before the mean is calculated. The **STDEV** (standard deviation) measures the variation in a data set and determines how far the data value are from the mean, on the average. The **SEMEAN** (sampling error of the mean) indicates the amount of error that resulted from the sampling.

2. Linear Correlation

The linear correlation coefficient represented in Table II describes the strength of the linear (straight line) relationship between two variables. The linear correlation coefficient, r, is always between -1 and 1. Values of r close to -1 or +1 indicate a strong linear relationship between the

variables and that the variable x is a good linear predictor of the variable y-that is, the regression equation is quite useful for making predictions. On the other hand values of r near 0 indicate a weak linear relationship between the variables and that the variable x is not too useful as a linear predictor of the variable y-that is, the regression equation is not very valuable for making predictions. Positive values of r suggest that the variables are positively linearly correlated, meaning that y tends to increase linearly as increased, with the tendency being greater the closer that r is to 1. Negative values of r suggest that the variables are negatively linearly correlated, meaning that y tends to decrease linearly as x increases, with the tendency being greater the closer that r is to -1. If the value of r is near 0, then the slope of the regression line is also near 0, thus indicating that there is probably no linear relationship between the variables. Coefficient values of .7 and higher were chosen from the data set represented in Table II for further examination. This cutoff was arbitrary: for there are no adopted standards.

3. Factor Analysis

Factor analysis enabled us to see whether or not some underlying pattern of relationships existed such that the data could be "rearranged" or "reduced" to a smaller set of factors or components that may be taken as source variables accounting

for the observed interrelations in the data. The three steps used were:

- The preparation of the correlation matrix.
- The extraction of the initial factors -- the exploration of possible data reduction, and
- The rotation to a terminal solution -- the search for simple and interpretable factors. The principle component analysis extracted initial factors in a way that made them independent from the others; that is factors are orthogonal. This approach shows the best linear combination of the variables -- best in the sense that the particular combination of variables would account for more of the variance in the data as a whole than any other linear combination of variables.

4. Linear Regressions

R-squared was used in linear regression as an attempt to measure the proportion of variance in one variable "explained" by the other.

E. DATA ANALYSIS

1. Mean Values and Standard Deviations

The mean scores of the 40 questions and their respective standard deviations are provided in Table I.

2. Correlation Matrix

A correlation analysis of the data gathered from the questionnaire is represented in Table II.

Question 1 correlated with question (3) which indicates that there is a strong linear relationship between system flexibility and output. This correlation coefficient

TABLE I
MEAN SCORES AND STANDARD DEVIATIONS

	N	N*	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
Q1	51	12	3.000	3.000	3.000	1.600	0.224
Q2	61	2	2.574	2.000	2.527	1.190	0.152
Q3	57	6	3.404	4.000	3.451	1.545	0.205
Q4	56	7	3.536	4.000	3.600	1.464	0.196
Q5	58	5	3.534	4.000	3.596	1.392	0.183
Q6	56	7	2.232	2.000	2.140	1.388	0.185
Q7	59	4	3.966	4.000	4.075	1.313	0.171
Q8	60	3	3.633	4.000	3.704	1.365	0.176
Q9	59	4	3.729	4.000	3.811	1.362	0.177
Q10	57	6	4.211	5.000	4.333	1.114	0.148
Q11	58	5	3.431	4.000	3.481	1.464	0.192
Q12	55	8	3.545	4.000	3.612	1.317	0.178
Q13	58	5	3.810	4.000	3.904	1.331	0.175
Q14	55	8	3.364	4.000	3.408	1.393	0.188
Q15	55	8	3.764	4.000	3.857	1.261	0.170
Q16	55	8	3.691	4.000	3.776	1.303	0.176
Q17	51	12	1.843	1.000	1.689	1.286	0.180
Q18	58	5	3.259	3.500	3.288	1.482	0.195
Q19	62	1	3.323	4.000	3.357	1.534	0.195
Q20	62	1	3.387	4.000	3.429	1.561	0.198
Q21	52	11	3.615	4.000	3.696	1.360	0.189
Q22	59	4	3.610	4.000	3.679	1.414	0.184
Q23	59	4	3.627	4.000	3.698	1.285	0.167
Q24	59	4	2.254	2.000	2.170	1.372	0.179
Q25	60	3	3.483	4.000	3.537	1.444	0.186
Q26	58	5	2.328	2.000	2.250	1.419	0.186
Q27	56	7	3.571	4.000	3.640	1.291	0.173
Q28	62	1	3.758	4.000	3.839	1.363	0.173
Q29	51	12	2.667	2.000	2.622	1.519	0.213
Q30	57	6	3.474	4.000	3.529	1.377	0.182
Q31	55	8	1.855	1.000	1.714	1.193	0.161
Q32	59	4	3.864	4.000	3.962	1.332	0.173
Q33	52	11	3.038	3.000	3.043	1.546	0.214
Q34	52	11	2.769	3.000	2.739	1.516	0.210
Q35	61	2	3.246	4.000	3.273	1.535	0.196
Q36	54	9	2.833	3.000	2.812	1.299	0.177
Q37	57	6	3.281	3.000	3.314	1.411	0.187
Q38	34	29	3.235	3.500	3.267	1.257	0.216
Q39	57	6	3.509	4.000	3.569	1.269	0.168
Q40	61	2	3.148	3.000	3.164	1.276	0.163

also indicates that system output is a good predictor of system flexibility.

Question 3 correlated with questions (4, 8, 19, 20), which indicates that there is a strong linear relationship

TABLE II
CORRELATION ANALYSIS

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Q2	0.223										
Q3	0.667	0.368									
Q4	0.584	0.543	0.778								
Q5	0.517	0.359	0.673	0.725							
Q6	-0.416	-0.208	-0.475	-0.552	-0.668						
Q7	0.457	0.441	0.572	0.747	0.647	-0.441					
Q8	0.626	0.321	0.751	0.766	0.771	-0.517	0.805				
Q9	0.600	0.252	0.627	0.692	0.748	-0.445	0.650	0.875			
Q10	0.372	0.305	0.456	0.672	0.666	-0.401	0.768	0.770	0.706		
Q11	0.559	0.225	0.611	0.644	0.676	-0.272	0.642	0.678	0.600	0.639	
Q12	0.582	0.125	0.539	0.483	0.632	-0.264	0.579	0.699	0.689	0.769	0.742
Q13	0.573	0.270	0.607	0.709	0.696	-0.434	0.742	0.831	0.793	0.833	0.724
Q14	0.389	0.024	0.382	0.272	0.527	-0.290	0.416	0.557	0.512	0.495	0.499
Q15	0.577	0.260	0.615	0.728	0.784	-0.538	0.738	0.897	0.799	0.824	0.720
Q16	0.506	0.126	0.681	0.650	0.656	-0.403	0.677	0.799	0.708	0.753	0.755
Q17	-0.061	0.138	0.122	0.062	0.243	-0.110	0.211	0.234	0.162	0.184	0.211
Q18	0.687	0.161	0.645	0.707	0.747	-0.581	0.583	0.765	0.728	0.696	0.659
Q19	0.628	0.302	0.725	0.789	0.678	-0.499	0.621	0.724	0.642	0.663	0.715
Q20	0.696	0.322	0.710	0.835	0.721	-0.540	0.683	0.796	0.735	0.681	0.695
Q21	0.683	0.232	0.634	0.681	0.726	-0.515	0.631	0.796	0.756	0.700	0.611
Q22	0.497	0.188	0.633	0.737	0.579	-0.347	0.504	0.601	0.617	0.553	0.655
Q23	0.712	0.335	0.684	0.762	0.725	-0.459	0.619	0.788	0.813	0.717	0.664
Q24	-0.485	-0.115	-0.431	-0.552	-0.283	0.351	-0.227	-0.283	-0.191	-0.240	-0.271
Q25	0.502	0.412	0.662	0.785	0.762	-0.579	0.607	0.664	0.683	0.602	0.588
Q26	-0.211	-0.109	-0.224	-0.191	-0.310	0.242	-0.076	-0.161	-0.062	-0.054	-0.147
Q27	0.428	0.250	0.506	0.553	0.455	-0.250	0.330	0.483	0.537	0.505	0.408
Q28	0.496	0.374	0.536	0.685	0.561	-0.315	0.580	0.623	0.587	0.747	0.657
Q29	-0.581	-0.144	-0.441	-0.464	-0.357	0.359	-0.198	-0.386	-0.302	-0.276	-0.366
Q30	0.568	0.204	0.526	0.590	0.627	-0.344	0.478	0.665	0.682	0.669	0.588
Q31	-0.281	-0.177	-0.214	-0.325	-0.318	0.274	-0.205	-0.352	-0.339	-0.365	-0.254
Q32	0.459	0.372	0.539	0.674	0.584	-0.263	0.643	0.653	0.635	0.700	0.681
Q33	-0.430	-0.203	-0.403	-0.575	-0.550	0.555	-0.412	-0.423	-0.426	-0.197	-0.407
Q34	-0.423	-0.300	-0.507	-0.486	-0.523	0.527	-0.398	-0.485	-0.423	-0.296	-0.282
Q35	0.501	0.235	0.397	0.339	0.349	-0.050	0.382	0.431	0.370	0.394	0.446
Q36	0.087	-0.091	0.142	0.176	0.362	-0.156	0.249	0.318	0.307	0.279	0.352
Q37	0.528	0.117	0.525	0.468	0.483	-0.253	0.383	0.531	0.449	0.566	0.689
Q38	0.100	-0.057	0.176	0.247	0.436	-0.150	0.351	0.305	0.243	0.541	0.485
Q39	0.591	0.259	0.575	0.640	0.604	-0.444	0.540	0.679	0.538	0.721	0.592
Q40	0.344	0.030	0.311	0.435	0.448	-0.367	0.280	0.393	0.433	0.342	0.424

between ease of error correction and clarity of information, system expectation, and ease of use.

Question 4 correlated with questions (5, 8, 13, 15, 18, 19, 20, 22, 23, 25), which indicates that there is a strong relationship between enjoyment of using the system and the system providing clear information, system output being

TABLE II
CORRELATION ANALYSIS (continued)

	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Q13	0.732										
Q14	0.788	0.473									
Q15	0.813	0.875	0.715								
Q16	0.758	0.906	0.580	0.872							
Q17	0.206	0.173	0.173	0.139	-0.024						
Q18	0.708	0.699	0.515	0.835	0.697	0.154					
Q19	0.660	0.775	0.439	0.788	0.754	0.022	0.805				
Q20	0.670	0.798	0.466	0.807	0.748	0.024	0.744	0.823			
Q21	0.775	0.771	0.701	0.878	0.768	0.052	0.850	0.825	0.792		
Q22	0.656	0.643	0.449	0.682	0.660	0.097	0.812	0.777	0.767	0.767	
Q23	0.737	0.767	0.521	0.856	0.753	0.041	0.787	0.795	0.837	0.878	0.746
Q24	-0.237	-0.238	-0.231	-0.393	-0.347	0.12	-0.440	-0.506	-0.539	-0.431	-0.573
Q25	0.548	0.676	0.337	0.688	0.633	0.042	0.680	0.747	0.820	0.696	0.745
Q26	-0.199	-0.079	-0.338	-0.186	-0.094	0.006	-0.311	-0.235	-0.22	-0.272	-0.342
Q27	0.542	0.498	0.504	0.595	0.497	0.142	0.658	0.560	0.5	0.658	0.768
Q28	0.647	0.760	0.395	0.769	0.745	0.064	0.642	0.757	0.7	0.699	0.762
Q29	-0.295	-0.288	-0.253	-0.439	-0.396	0.065	-0.547	-0.429	-0.4	-0.419	-0.567
Q30	1.682	0.654	0.490	0.794	0.664	0.133	0.723	0.659	0.66	0.760	0.660
Q31	-0.265	-0.292	-0.252	-0.407	-0.369	0.180	-0.375	-0.416	-0.359	-0.499	-0.351
Q32	0.626	0.734	0.452	0.746	0.755	0.185	0.561	0.655	0.689	0.710	0.696
Q33	-0.163	-0.391	-0.108	-0.398	-0.370	0.045	-0.418	-0.404	-0.404	-0.318	-0.252
Q34	-0.262	-0.423	-0.219	-0.409	-0.338	-0.066	-0.367	-0.416	-0.471	-0.421	-0.304
Q35	0.423	0.338	0.402	0.434	0.378	-0.104	0.234	0.382	0.276	0.457	0.240
Q36	0.355	0.211	0.514	0.440	0.367	-0.035	0.188	0.234	0.263	0.350	0.235
Q37	0.610	0.496	0.342	0.613	0.597	0.084	0.557	0.644	0.598	0.555	0.588
Q38	0.514	0.260	0.537	0.499	0.474	-0.300	0.376	0.364	0.351	0.464	0.516
Q39	0.600	0.600	0.458	0.759	0.678	0.025	0.700	0.757	0.697	0.763	0.658
Q40	0.400	0.314	0.461	0.467	0.409	0.030	0.439	0.409	0.397	0.579	0.387

	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33
Q24	-0.375										
Q25	0.775	-0.406									
Q26	-0.264	0.371	-0.275								
Q27	0.617	-0.376	0.520	-0.370							
Q28	0.734	-0.410	0.715	-0.159	0.652						
Q29	-0.340	0.687	-0.310	0.461	-0.527	-0.382					
Q30	0.732	-0.416	0.640	-0.098	0.765	0.730	-0.491				
Q31	-0.354	0.273	-0.423	0.371	-0.276	-0.397	0.423	-0.391			
Q32	0.670	-0.241	0.672	-0.049	0.588	0.872	-0.255	0.678	-0.371		
Q33	-0.328	0.290	-0.495	0.064	-0.202	-0.325	0.340	-0.476	0.308	-0.419	
Q34	-0.452	0.351	-0.588	0.279	-0.160	-0.346	0.234	-0.431	0.273	-0.342	0.590
Q35	0.408	-0.137	0.251	-0.066	0.324	0.475	-0.199	3.397	-0.242	0.581	-0.274
Q36	0.208	-0.207	0.201	-0.240	0.247	0.246	-0.267	0.364	-0.310	0.389	-0.202
Q37	0.479	-0.506	0.403	-0.117	0.387	0.619	-0.605	0.636	-0.438	0.512	-0.402
Q38	0.219	-0.561	0.333	-0.352	0.381	0.400	-0.467	0.435	-0.406	0.344	-0.230
Q39	0.636	-0.475	0.557	-0.238	0.457	0.730	-0.595	0.642	-0.554	0.670	-0.294
Q40	0.357	-0.116	0.368	-0.129	0.356	0.383	-0.308	0.490	-0.549	0.467	-0.393

	Q34	Q35	Q36	Q37	Q38	Q39
Q35	-0.165					
Q36	-0.057	0.353				
Q37	-0.184	0.414	0.341			
Q38	-0.056	0.187	0.498	0.665		
Q39	-0.219	0.494	0.319	0.759	0.539	
Q40	-0.293	0.306	0.609	0.440	0.447	0.500

useful, system reliability, relevancy of information, system expectations of user is met, ease of use, efficiency and system convenience. The correlation coefficient also indicates that clear information, useful output, reliability, relevancy of information, ease of use, efficiency and system convenience are good predictors of system usage.

Question 5 correlated with questions (8, 9, 15, 18, 20, 23, 25), which indicate that there is a strong linear relationship between satisfaction with the useful format of the output and clear information, happiness with the output, output relevancy, output expectations, ease of use, understandable output and system convenience. The correlation coefficients also indicates that clear information, happiness with the output, output relevancy, output expectations, ease of use, understandable output and system convenience, are good predictors of how satisfied the end-users will be with the format of the output.

Question 7 correlated with questions (10, 13, 15), which indicates that there is a strong linear relationship between system accuracy, reliability and relevancy of information and therefore system reliability and relevancy of information are strong predictors of system accuracy.

Question 8 correlated with questions (9, 10, 16, 18, 19, 20, 21, 23), which indicates that there is a strong linear relationship between satisfaction with clarity of information provided by the system and satisfaction with the layout of the

output, system accuracy, output relevancy, output reliability, output expectations are met, ease of use and understandable information.

Question 9 correlated with questions (10, 13, 15, 16, 18, 20, 21, 23), which indicates that there is a strong linear relationship between end users satisfaction with the layout of the output and system accuracy, if end-users trust the information provided by the system, if the output is relevant, if the output is reliable, if the system provides the information the end-user needs, if the system is easy to use, if the reports are complete and if the outputs are easy to understand.

Question 10 correlated with question (12, 13, 15, 16, 21, 23, 28, 32, 39), which indicates that there is a strong linear relationship between the accuracy of the system and the system providing up-to-date information, reliability of the system, relevancy of the output provided by the system. completed reports, ease of understanding the output, syste dependability, and satisfaction with the software application.

Question 11 correlated with questions (12, 13, 15, 16, 19), which indicates a strong linear relationship between the system providing sufficient information and the system providing up to date information, end-users trusting the information provided by the system, relevancy of the output, reliability of the output and end-user expectations of the system.

Question 12 correlated with questions (13, 16, 18, 21, 23), which indicates a strong linear relationship between the system providing up-to-date information, and trusting the information provided by the system, reliability of the system, expectation of end-users of the reports provided by the system, completeness of reports and ease of understanding the output provided by the system.

Question 13 correlated with questions (15, 16, 19, 20, 21, 23, 28, 32), which indicates that there is a strong linear relationship between the end-user trusting the information provided by the system and the relevancy of the output, the reliability of the output, the expectations of the end-user of the system, ease of use, completed reports, and dependability of the system.

Question 14 correlated with questions (15, 21), which indicates a strong linear correlation between receiving timely information from the Internal Revenue Service and output relevancy and completed reports.

Question 15 correlated with questions (18, 19, 20, 21, 23, 29, 30, 32, 39), which indicates that there is a strong linear correlation between end-users finding the output relevant and the reports being exactly what the user wanted, the system working to the end-user's expectations, system ease of use, system being easy to understand, system reliability, system dependability, satisfaction with software application.

Question 16 correlated with questions (19, 20, 21, 23, 28 32), which indicates a strong linear correlation between output reliability and end-user expectation of system, system ease of use, completed reports, and system dependability.

Question 18 correlated with questions (20, 21, 22, 23, 30, 39), which indicates a strong linear relationship between the system providing the end-user with the reports that seem to be just about exactly what he/she needed and the system ease of use, completed reports, system efficiency, output easy to understand, the information content meeting the user's need and satisfaction with the software application.

Question 19 correlated with questions (22, 23, 25, 28, 39), which indicates a strong linear relationship between the system meeting the expectations of the end-user and system efficiency, the output being easy to understand, system convenience system reliability and satisfaction with software application.

Question 20 correlated with questions (1, 22, 25, 28), which indicates a strong linear correlation between system ease of use and completed reports, system efficiency, system convenience and system reliability.

Question 21 correlated with questions (22, 30, 32, 39), which indicates that there is a strong linear relationship between system ease of use and system efficiency, information content meeting end-user's need, system dependability and satisfaction with software application.

Question 22 correlated with questions (23, 25, 27, 28), which indicates that there is a strong linear relationship between system efficiency and the output being easy to understand, system convenience, system providing comprehensible information and system dependency.

Question 23 correlated with questions (25, 28 ,30), which indicates that there is a strong linear relationship between the output being easy to understand and system reliability and the information contents meeting the user's need.

Question 25 correlated with question 28, which indicates that there is a strong linear relationship between system convenience and system reliability.

Question 27 correlated with question 30, which indicates that there is a strong linear relationship between the system providing comprehensible information and the information contents meeting the user's need.

Question 28 correlated with questions (30, 32, 39), which indicates that there is a strong linear relationship between the system reliability and the information content meeting the user's need, system dependability and satisfaction with the software application.

Question 37 correlated with question 39, which indicates a strong linear relationship between the satisfaction of end-users with the information/training

provided by the IRS and how satisfied they were with the software application.

3. Factor Analysis

Using the sample of 63 responses, the data was examined using Exploration factor analysis to summarize or reduce the data set of the original 40 questions. We first used principal component shown in Table III.

Without specifying the number of factors, seven factors with eigne values greater than one emerged. We then tried to delineate more clearly the clustering and grouping of questions than the initial principal component matrix pattern showed us, by the use of rotational factor analysis which is shown in Table IV.

This method arrived at the terminal factors that satisfied our need. The first principal component, therefore, may be viewed as the single best summary of linear relationships exhibited in the data. We have determine this component to be **RELIABILITY OF THE ELECTRONIC FILING SYSTEM PROGRAM.** The second component is defined as the second best linear combination of variables, under the condition that the second component is orthogonal to the first. The second component may be defined as the linear combination of variables that accounts for the most residual variance after the effect of the first component is removed from the data, we have determined this component to be **USER-PERCEIVED QUALITY OF**

TABLE III
INITIAL FACTOR METHOD: PRINCIPAL COMPONENTS FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7
Q22	0.97856	.	.	.	.	.	.
Q21	0.94426	.	.	.	.	.	.
Q15	0.92970	.	.	.	.	.	.
Q28	0.90537	.	.	.	.	.	.
Q16	0.89998	.	.	.	.	.	.
Q30	0.89947	.	.	.	.	.	.
Q8	0.89535	.	.	.	.	.	.
Q12	0.88738	.	.	.	.	.	.
Q19	0.88544	.	.	.	.	.	.
Q13	0.88456	.	.	.	.	.	.
Q20	0.88340	.	.	.	.	.	.
Q18	0.88079	.	.	.	.	.	.
Q7	0.86672	.	.	.	.	.	.
Q23	0.86273	.	.	.	.	.	.
Q27	0.85528	.	.	.	.	.	.
Q9	0.84541	.	.	.	.	.	.
Q32	0.84405	.	.	.	.	.	.
Q11	0.83279	0.41511	.	.	.	.	.
Q10	0.82378	.	.	.	.	.	.
Q25	0.80779	-0.50846	.	.	.	.	.
Q5	0.79532	.	.	.	.	.	.
Q38	0.79436	.	.	.	.	.	.
Q14	0.73555	.	.	.	.	.	.
Q4	0.71574	-0.45283	.	.	.	.	.
Q39	0.69113	0.48753	.	.	.	.	.
Q37	0.65435	0.48554	.	.	.	.	.
Q3	0.50037	.	0.43292	.	.	.	-0.47408
Q2	0.44808	-0.43388	.	.	.	.	.
Q33	-0.51742	0.48487	.	.	.	.	.
Q29	-0.53698	.	0.50406	.	.	.	.
Q24	-0.63846	.	0.63780	.	.	.	.
Q36	.	0.70902	.	-0.42263	.	.	.
Q34	-0.50747	0.59219	.	.	.	.	.
Q6	.	0.54069	0.58198	.	.	.	.
Q35	.	.	0.55431	.	.	.	.
Q40	.	0.43710	0.52877	.	-0.46819	.	.
Q26	-0.45608	.	.	0.76080	.	.	.
Q17	.	0.60851	.	0.65952	.	.	.
Q1	0.46709	.	.	-0.66046	0.43660	.	.
Q31	-0.43766	.	.	.	.	0.71425	.

SOFTWARE APPLICATION. Subsequent components were defined similarly until all the variance in the data was exhausted, and we have found these subsequent components to be **AMOUNT OF TIME PLANNED TO USE EFS, FLEXIBILITY OF THIRD PARTY SOFTWARE**

TABLE IV
ROTATION METHOD: VARIMAX ROTATED FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7
Q32	0.91682	.	.	.	.	.	.
Q8	0.88589	.	.	.	.	.	.
Q27	0.87245	.	.	.	.	.	.
Q13	0.86362	.	.	.	.	.	.
Q9	0.85791	.	.	.	.	.	.
Q16	0.81000	0.50287	.	.	.	.	.
Q28	0.78777	.	.	.	.	.	.
Q22	0.77675	0.48627	.	.	.	.	.
Q15	0.77256	0.48298	.	.	.	.	.
Q21	0.76129	0.44985	.	.	.	.	.
Q14	0.75250	.	.	.	.	.	.
Q30	0.69381	.	.	.	.	.	.
Q12	0.67748	0.58423	.	.	.	.	.
Q23	0.65488	.	0.41490	-0.44276	.	.	.
Q7	0.65347	0.55389	.	.	.	.	.
Q20	0.65181	.	0.46834	-0.47713	.	.	.
Q18	0.61940	0.58485	.	.	.	.	.
Q39	.	0.88111	.	.	.	.	.
Q37	.	0.87870	.	.	.	.	.
Q10	0.45684	0.78003	.	.	.	.	.
Q38	.	0.76533	.	.	.	.	.
Q11	0.54293	0.66867	.	.	0.40481	.	.
Q5	.	0.59420	0.53699	.	.	.	.
Q19	0.46071	0.58813	0.45389	.	.	.	.
Q29	.	-0.57087		0.55289	.	.	.
Q24	.	-0.60358	.	0.44484	.	.	.
Q2	.	.	0.81644	.	.	.	.
Q4	.	.	0.80922	.	.	.	.
Q25	0.53875	.	0.65955	-0.40875	.	.	.
Q33	.	.	-0.60940	.	.	.	0.49373
Q34	.	.	-0.73812	.	.	.	.
Q26	.	.	.	0.77261	.	.	.
Q17	.	.	-0.67839	0.70629	.	.	.
Q1	0.46311	.	.	-0.81114	.	.	.
Q40	.	.	.	.	0.85571	.	.
Q36	.	.	.	.	0.79302	.	.
Q6	.	.	.	.	0.42463	0.74495	.
Q35	.	.	.	.	.	0.71561	.
Q3	.	.	0.45970	.	.	0.56457	.
Q31	.	.	.	.	.	.	0.86373

APPLICATION, PERCEIVED QUALITY OF INFORMATION PROVIDED BY THE IRS, EASE OF USE AND EFFICIENCY OF SOFTWARE AND CORRECTION MECHANISM. We tried further to achieve more precise and interpretable factors, the analysis was conducted specifying

two, three, four, five, and six factors. The most interpretable factors were seven. The variance explained by each factor is shown in Table V.

TABLE V
VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7
12.564297	7.649598	5.625159	3.668108	2.638229	2.260931	1.836028

FACTOR 1: Questions (32, 8, 27, 13, 9, 16, 28, 22, 15, 21, 14, 30, 12, 23, 7, 20) are the dependent variables which accounts for Factor 1. All of the retained questions taken together seems to suggest that **RELIABILITY OF THE ELECTRONIC FILING SYSTEM PROGRAM** is the most representative issue identified by Factor 1 and accounts for 12.56 percent of the variance. The questions for Factor 1 were:

32 - Do you find the EFS system dependable?

8 - Is the information clear?

27 - Does the system provide comprehensive information?

13 - Do you trust the information provided by the system?

9 - Are you happy with the layout of the output?

16 - Do you feel the output is reliable?

28 - Do you think the system is reliable?

22 - Is the system efficient?

15 - Do you find the output relevant?

21 - Are the reports complete?

14 - Do you get the information you need in time from the IRS?

30 - Does the information content meet your needs?

12 - Does the system provide up to date information?

23 - Is the output easy to understand?

7 - Are you satisfied with the accuracy of the system?

20 - Is the system easy to use?

FACTOR 2: Questions (39, 37, 10, 38, 11, 5, 19, 24) are the dependent variables which accounts for Factor 2. All of the retained questions taken together seem to suggest that **USER-PERCEIVED QUALITY OF SOFTWARE APPLICATION** is the most representative issue identified by Factor 2 and accounts for 7.6 percent of the variance. The questions for Factor 2 were:

39 - How satisfied are you with the application?

37 - How satisfied are you with the information/training provided by the software vendor?

10 - Is the system accurate?

38 - How satisfied are you with the information/training provided by the tax consultant?

11 - Does the system provide sufficient information?

5 - Do you think the output is presented in a useful format?

19 - Does the system work to your expectations?

24 - Is the system troublesome?

FACTOR 3: Questions (24, 25, 33, 34) are the dependent variables which accounts for Factor 3. All of the retained questions taken together seem to suggest that **AMOUNT OF TIME PLANNED TO USE EFS** is the most representative issue identified by Factor 3 and accounts for 5.6 percent of the Variance. The questions for Factor 3 were:

2 - How much time do you plan to use EFS?

4 - Do you enjoy using the system?

25 - Is the system convenient?

33 - Would you like the EFS system to be modified or redesigned?

34 - Would you like the format modified?

FACTOR 4: Questions (26,17,1,40,36) are the dependent variables which accounts for Factor 4. All of the retained questions taken together seem to suggest that **FLEXIBILITY OF THIRD PARTY SOFTWARE APPLICATION** is the most representative issue identified by Factor 4 and accounts for 3.6 percent of the variance. The questions for Factor 4 were:

26 - Is the system difficult to interact with?

17 - Does the system provide too much information?

1 - Is the system flexible?

FACTOR 5: Questions (40, 36, 6) are the dependent variables which accounts for Factor 5. All of the retained questions taken together seem to suggest that **PERCEIVED QUALITY OF INFORMATION PROVIDED BY THE IRS** is the most representative issue identified by Factor 5 and accounts for 2.6 percent of the variance. The questions for Factor 5 were:

40 - How satisfied are you with the tax literature regarding EFS?

36 - How satisfied are you with the information training provided by the IRS?

FACTOR 6: Questions (6, 35, 3) are the dependent variables which accounts for Factor 6. All of the retained questions taken together seem to suggest that **EASE OF USE AND EFFICIENCY OF SOFTWARE** is the most representative issue identified by factor 6 and accounts for 2.2 percent of the variance. The questions for Factor 6 were:

6 - Is the system difficult to operate?

35 - Do you get feedback fast enough?

3 - Is it easy to correct errors?

FACTOR 7: Question (31) is the dependent variable which accounts for Factor 7. The retained question seem to suggest that **CORRECTION MECHANISM** is the most representative issue identified by Factor 7 and accounts for 1.8 percent of the variance. The question for Factor 7 was:

31 - Does the information you receive require correction?

4. Linear Regression

An attempt to relate the seven factors discussed in the previous section to the number of returns filed electronically has been done. We assumed that the number of tax returns is a function of the seven factors. The two conclusions that can be drawn from this analysis are: (1) The low usage of EFS could be explained by the lack of tax preparers' time devoted to EFS and (2) The fact that tax preparers perceived that the IRS EFS feedback is not fast enough. Table VI is an R-squared analysis including tax preparers who did not file tax returns electronically and is representative of the first finding. The Second finding represented in Table VII is an R-squared analysis and is representative of the tax preparers who filled electronically. For those tax preparers who actually used EFS, **EASE OF USE, RELIABILITY,** and **PERCEIVED QUALITY OF INFORMATION,** are the most critical issues.

Stepwise regression was then used as an attempt to explain other Factors, the results were inconclusive. The seven interpretable Factors that satisfied our model are represented in Figure 2.

TABLE VI
REGRESSION MODELS FOR DEPENDENT VARIABLE:
MODEL: MODEL 1

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
1	0.00562228	Q1726
1	0.00831622	Q31
1	0.04101621	Q39
1	0.04520710	Q640
1	0.07468453	Q32
1	0.09423416	Q35
1	0.17047368	Q2
2	0.09933327	Q35 Q31
2	0.09993230	Q35 Q1726
2	0.10180481	Q35 Q39
2	0.10799732	Q32 Q640
2	0.10839290	Q35 Q32
2	0.17385373	Q35 Q640
2	0.17491748	Q2 Q31
2	0.18301853	Q2 Q1726
2	0.18363681	Q2 Q640
2	0.18940624	Q2 Q39
2	0.19307928	Q2 Q32
2	0.24048027	Q2 Q35
3	0.19309760	Q2 Q640 Q31
3	0.19384458	Q2 Q32 Q31
3	0.19658716	Q2 Q32 Q39
3	0.19836022	Q2 Q39 Q1726
3	0.20081296	Q2 Q39 Q640
3	0.20491611	Q2 Q32 Q640
3	0.20685381	Q2 Q32 Q1726
3	0.24048117	Q2 Q35 Q32
3	0.24187467	Q2 Q35 Q39
3	0.24309462	Q2 Q35 Q31
3	0.25256486	Q2 Q35 Q1726
3	0.27436952	Q2 Q35 Q640
4	0.20830243	Q2 Q32 Q640 Q31
4	0.21433507	Q2 Q32 Q1726 Q640
4	0.24238564	Q2 Q35 Q39 Q32
4	0.24335405	Q2 Q35 Q31 Q32
4	0.24337146	Q2 Q35 Q31 Q39
4	0.25256664	Q2 Q35 Q1726 Q32
4	0.25282133	Q2 Q35 Q1726 Q31
4	0.25305437	Q2 Q35 Q1726 Q39
4	0.27440393	Q2 Q35 Q640 Q39
4	0.27623455	Q2 Q35 Q640 Q32
4	0.28062924	Q2 Q35 Q640 Q1726
4	0.28378852	Q2 Q35 Q640 Q31
5	0.21475496	Q2 Q32 Q1726 Q640 Q31
5	0.21582297	Q2 Q32 Q1726 Q640 Q39
5	0.24404351	Q2 Q35 Q31 Q39 Q32
5	0.25283553	Q2 Q35 Q1726 Q31 Q32
4	0.25310962	Q2 Q35 Q1726 Q39 Q31
4	0.25318591	Q2 Q35 Q1726 Q39 Q32
5	0.27715295	Q2 Q35 Q640 Q32 Q39
5	0.28063931	Q2 Q35 Q640 Q1726 Q32
5	0.28209931	Q2 Q35 Q640 Q1726 Q32
5	0.28583723	Q2 Q35 Q640 Q31 Q1726
5	0.28620227	Q2 Q35 Q640 Q31 Q39
5	0.29067577	Q2 Q35 Q640 Q31 Q32
6	0.19383792	Q35 Q640 Q31 Q39 Q1726
6	0.21588849	Q2 Q32 Q1726 Q640 Q39
6	0.25326493	Q2 Q35 Q1726 Q39 Q32 Q31
6	0.28242226	Q2 Q35 Q640 Q1726 Q32 Q39
6	0.28785580	Q2 Q35 Q640 Q31 Q39 Q1726
6	0.29105693	Q2 Q35 Q640 Q31 Q32 Q39
6	0.2913986	Q2 Q35 Q640 Q31 Q32
7	0.29176667	Q2 Q35 Q640 Q31 Q32 Q1726 Q39

TABLE VII
REGRESSION MODELS FOR DEPENDENT VARIABLE: RETURNS
MODEL: MODEL 1

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
1	0.00026853	Q2
1	0.06049816	Q31
1	0.06761047	Q640
1	0.06898072	Q39
1	0.10173493	Q35
1	0.15208803	Q32
1	0.29913436	Q1726
2	0.16363095	Q640 Q31
2	0.17022263	Q32 Q39
2	0.18520986	Q32 Q39
2	0.19378084	Q32 Q640
2	0.26617076	Q32 Q35
2	0.30065383	Q1726 Q2
2	0.30168741	Q1726 Q31
2	0.31548265	Q1726 Q35
2	0.32468900	Q1726 Q39
2	0.32859822	Q35 Q640
2	0.39283465	Q1726 Q640
2	0.41749540	Q1726 Q32
3	0.36052634	Q35 Q640 Q31
3	0.37220185	Q35 Q640 Q39
3	0.39584707	Q1726 Q640 Q2
3	0.40598194	Q1726 Q640 Q31
3	0.41749683	Q1726 Q32 Q31
3	0.41954383	Q1726 Q32 Q39
3	0.42084395	Q1726 Q640 Q39
3	0.43285624	Q1726 Q32 Q2
3	0.44235619	Q1726 Q32 Q35
3	0.44437904	Q32 Q35 Q640
3	0.48261348	Q1726 Q32 Q640
3	0.49576645	Q1726 Q640 Q35
4	0.44412404	Q1726 Q32 Q35 Q31
4	0.44739722	Q32 Q35 Q640 Q2
4	0.45296473	Q32 Q35 Q640 Q39
4	0.45454021	Q1726 Q32 Q35 Q2
5	0.45636976	Q32 Q35 Q640 Q31
4	0.48613357	Q1726 Q32 Q640 Q31
4	0.48709248	Q1726 Q32 Q640 Q39
4	0.49640432	Q1726 Q640 Q35 Q2
5	0.49894877	Q1726 Q32 Q640 Q2
4	0.49997110	Q1726 Q640 Q35 Q31
4	0.51743860	Q1726 Q640 Q35 Q31
4	0.58720731	Q1726 Q32 Q640 Q35
4	0.45715772	Q32 Q35 Q640 Q31 Q2
5	0.46054139	Q1726 Q32 Q35 Q2 Q31
5	0.46271714	Q32 Q35 Q640 Q31 Q39
5	0.48986952	Q1726 Q32 Q640 Q39 Q31
5	0.49939279	Q1626 Q32 Q640 Q2 Q31
5	0.49964576	Q1726 Q32 Q640 Q2 Q39
5	0.50007161	Q1726 Q640 Q35 Q31 Q2
5	0.51747945	Q1726 Q640 Q35 Q39 Q2
5	0.51927267	Q1726 Q640 Q35 Q39 Q31
5	0.58725523	Q1726 Q32 Q640 Q35 Q31
5	0.58914413	Q1726 Q32 Q649 Q35 Q39
5	0.59682698	Q1726 Q32 Q640 Q35 Q2
6	0.46058303	Q1726 Q32 Q35 Q2 Q31 Q39
6	0.46274876	Q32 Q35 Q640 Q31 Q39 Q2
6	0.50008688	Q1726 Q32 Q640 Q2 Q39
6	0.51952636	Q1726 Q640 Q35 Q39 Q31
5	0.58915215	Q1726 Q32 Q640 Q35 Q39
6	0.59699380	Q1726 Q32 Q640 Q35 Q2
5	0.59736993	Q1726 Q32 Q640 Q35 Q2
7	0.59753465	Q1726 Q32 Q640 Q35 Q2 Q31 Q39

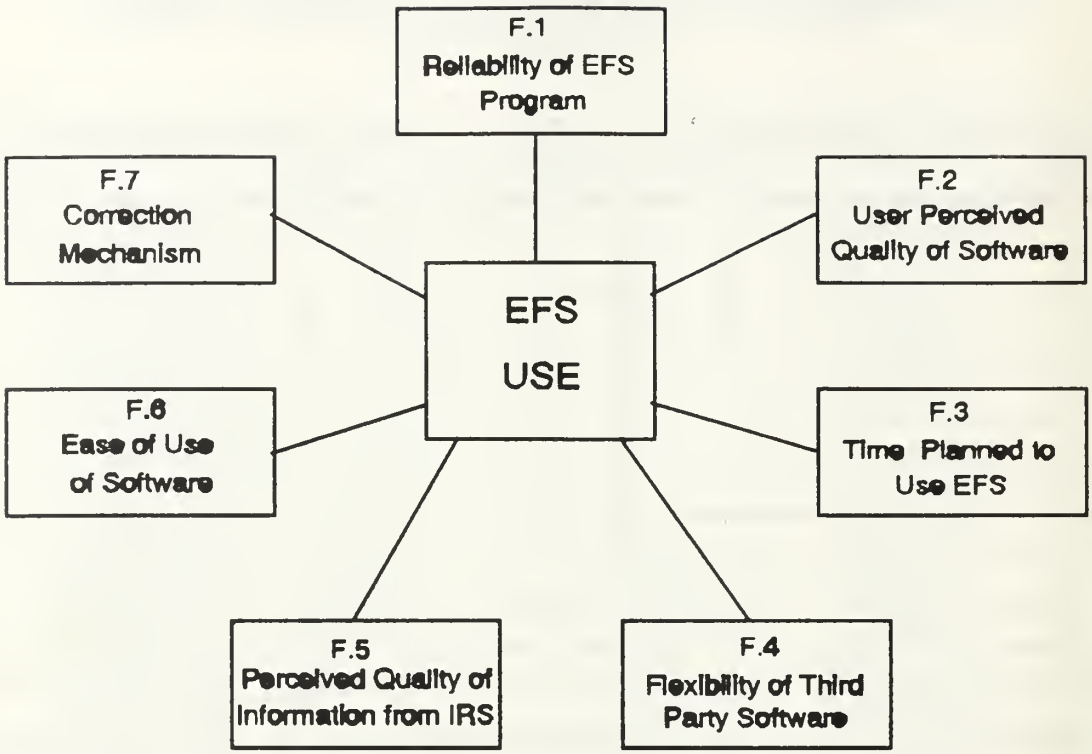

Figure 2. Summary of the Model

RETAINED QUESTIONS RELATED TO THE MODEL:

RELIABILITY OF THE ELECTRONIC FILING SYSTEM PROGRAM
F.1 - Do you find the EFS system dependable?

USER-PERCEIVED QUALITY OF SOFTWARE
F.2 - How satisfied are you with the application?

AMOUNT OF TIME PLANNED TO USE EFS
F.3 - How much time do you plan to use EFS?

FLEXIBILITY OF THIRD PARTY SOFTWARE APPLICATION
F.4 - Is the system difficult to interact with?
F.4 - Does the system provide too much information?

PERCEIVED QUALITY OF INFORMATION PROVIDED BY THE IRS
F.5 - How satisfied are you with the tax literature regarding EFS?
F.5 - How satisfied are you with the information training provided by the IRS?

EASE OF USE AND EFFICIENCY OF SOFTWARE
F.6 - Is the system difficult to operate?
F.6 - Do you get feedback fast enough?

CORRECTION MECHANISM
F.7 - Does the information you receive require correction?

VI. SUMMARY:

A. SUMMARY OF RESULTS

This study represents significant findings in the Factors end-users perceived are important in the measurement of end-user computing satisfaction. Our statistical analysis confirm some of the verbal recommendations made by the tax preparers surveyed. Training appears to be one of the most important Factors to convince the tax preparers of the reliability of EFS. The scores obtained for the questions representing Factor 1 (RELIABILITY OF THE EFS PROGRAM) were approximately 3.7, we suspect that the tax preparers should be encouraged to devote more time in getting acquainted with the documentation provided by the IRS which was generally perceived as satisfactory. Overall, all of the questions representing the seven Factors received high scores from the survey. This suggests that we should find other Factors that could be used to infuse more incentive in EFS usage. The survey indicates that cost is a significant factor. This is particularly true for small firms who perceive that the initial investment is too costly for EFS use.

B. SUGGESTIONS FOR FUTURE RESEARCH

Our empirical research confirmed the redundancy of some of the questions from the original 40 questions identified by

Doll and Torkzadeh. It was expected that some of the questions would be grouped together, however, the factor analysis spread them over the seven factors. This scattering seems to imply that either these questions were not properly devised or the respondents were somewhat confused as to the wording of some of the questions.

VII. CONCLUSION

As the third party software for EFS increases in quality and reliability and as the EFS program starts its fifth year, we contend that technology will no longer be an implementation issue. Therefore, successful promotion of EFS would depend on the ability of the IRS to motivate the public at large, and as a consequence the tax preparers, recognize the real benefits of EFS.

END-USER SATISFACTION SURVEY OF THE IRS ELECTRONIC FILING SYSTEM PROGRAM (EFS)

Naval Postgraduate School
Monterey, CA 93943-5000

_____

To: _____

_____

_____

We are trying to determine the factors to be considered to ensure a successful implementation of the EFS program. Enclosed is a questionnaire adopted from the MIS literature to measure end-user computing satisfaction. You may find some of the questions redundant or closely related to one another for statistical purposes.

Please take a few minutes to complete this survey and return it to us in the stamped, self-addressed envelope by _____. We guarantee that all the information you provided will be held confidential. If you would like a copy of the completed study please indicate on the last page of the survey.

Thank you for your time.

Margaret Y. Hall
Lt USN, Graduate Student

Professor Tung Bui, PhD
Thesis Advisor

Encl. (4)

Section I

Name of interviewee:_____

Address:_____

Name of Company:_____

Your Function at Company:_____

Years of experience with the Electronic Filing System:_____

Number of tax preparers in your company:_____

Number of tax preparers dealing with EFS:_____

Number of tax preparers planning to use EFS in the near future:_____

Hardware Environment:

Type of computer :_____

Type of modem used (baud): 9600_____

4800_____

1200_____

300 _____

Number of modems used:_____

Type of Operating System:_____/Version:_____

Section II

MEASURES OF END-USER COMPUTING SATISFACTION

Please enter the name of software application used for the Electronic Filing System._____(If more than one software application is used please specify:)_____

_____

For each of the following questions please *mark an X* in the box which best describe your satisfaction with this application, using a 0-5 scale where: 0 = Not Applicable (N/A); 1 = almost never; 2 = some of the time; 3 = about half of the time; 4 = most of the time; and 5 = almost always.

0 = Not Applicable
1 = Almost Never
2 = Some of the time
3 = About half of the time
4 = Most of the time
5 = Almost always

	0	1	2	3	4	5
1. Is the system flexible?						
2. How much time do you plan to use EFS?						
3. Is it easy to correct the errors?						
4. Do you enjoy using the system?						
5. Do you think the output is presented in a useful format?						
6. Is the system difficult to operate?						
7. Are you satisfied with the accuracy of the system?						
8. Is the information clear?						
9. Are you happy with the layout of the output?						
10. Is the system accurate?						
11. Does the system provide sufficient information? (e.g. documentation, on line help)						
12. Does the system provide up-to-date information? (e.g. software upgrade, information regarding new IRS protocols, etc.)						
13. Do you trust the information provided by the system?						
14. Do you get the information you need in time from the IRS?						
15. Do you find the output relevant?						
16. Do you feel the output is reliable?						
17. Does the system provide too much information regarding usage of the software?						
18. Does the system provide reports that seem to be just about exactly what you need?						
19. Does the system work to your expectations?						
20. Is the system easy to use?						
21. Are the reports complete? (e.g. carbon copy, statistical report on system usage, etc.)						
22. Is the system efficient?						

0 = Not Applicable
1 = Almost Never
2 = Some of the time
3 = About half of the time
4 = Most of the time
5 = Almost always

	0	1	2	3	4	5
3. Is the output easy to understand?						
4. Is the system troublesome?						
5. Is the system convenient?						
6. Is the system difficult to interact with?						
7. Does the system provide comprehensive information?						
8. Do you think the system is reliable?						
9. Would you like more concise output?						
0. Does the information content meet your needs?						
1. Does the information you receive require correction?						
2. Do you find the EFS system dependable?						
3. Would you like the EFS system to be modified or redesigned?						
4. Would you like the format modified?						
5. Do you get feedback fast enough? (e.g. acknowledged receipt of electronic filing).						
6. How satisfied are you with the information/training provided by the IRS?						
7. How satisfied are you with the information/training provided by the software vendor?						
8. How satisfied are you with the information/training provided by the tax consultants?						
9. How satisfied are you with the application?						
0. How satisfied are you with the tax literature regarding EFS?						

Section III

OPEN ENDED QUESTIONS

41. What aspects of the application, if any, are you most satisfied with?

_____

_____

_____

42. What aspects of the application, if any, are you most dissatisfied with?

_____

_____

_____

43. In your opinion what are the most important factors in promoting a successful use of EFS in your company?

_____

_____

_____

44. Other comments:

_____

_____

_____

_____

_____

45. Would you like to receive an executive report of this survey?

YES_____ NO_____

Thank you for your cooperation,

Lt. Margaret Y. Hall

Professor Tung Bui, PhD

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